DTIC FILE COPY

(1)

SECURITY CLASSIFICATION OF THIS PAGE

ICUMENTATION PAGE				Form Approved OMB No. 0704-0188
AD-A218 101		1b. RESTRICTIVE MARKINGS NONE		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE		3. DISTRIBUTION / AVAILABILITY OF REPORT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.		
4. PERFORMING ORGANIZATION REPORT NUMBER(S)		5. MONITORING ORGANIZATION REPORT NUMBER(S) AFIT/CI/CIA-89-022		
6a. NAME OF PERFORMING ORGANIZATION AFIT STUDENT AT Univ of Alabama at Birmingham	6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION AFIT/CIA		
6c. ADDRESS (City, State, and ZIP Code)		7b. ADDRESS (City, State, and ZIP Code) Wright-Patterson AFB OH 45433-6583		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS		
		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.

11. TITLE (Include Security Classification) (UNCLASSIFIED)
THE KNOWLEDGE LEVEL OF UNITED STATES AIR FORCE FLIGHT NURSES REGARDING THE INJURIES OF CONVENTIONAL WARFARE CASUALTIES

12. PERSONAL AUTHOR(S) CHERYL A. ALLEN

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Year, Month, Day)	15. PAGE COUNT
THESIS/~~DISSERTATION~~	FROM _____ TO _____	1989	81

16. SUPPLEMENTARY NOTATION APPROVED FOR PUBLIC RELEASE IAW AFR 190-1
ERNEST A. HAYGOOD, 1st Lt, USAF
Executive Officer, Civilian Institution Programs

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

DTIC ELECTE FEB 12 1990 S D B

20. DISTRIBUTION / AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☐ DTIC USERS	UNCLASSIFIED

22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE (Include Area Code)	22c. OFFICE SYMBOL
ERNEST A. HAYGOOD, 1st Lt, USAF	(513) 255-2259	AFIT/CI

DD Form 1473, JUN 86 Previous editions are obsolete. SECURITY CLASSIFICATION OF THIS PAGE

AFIT/CI "OVERPRINT"

THE KNOWLEDGE LEVEL OF UNITED STATES AIR FORCE FLIGHT NURSES REGARDING THE INJURIES OF CONVENTIONAL WARFARE CASUALTIES

by

CHERYL A. ALLEN

A Research Project

Submitted in partial fulfillment of the requirements in the course NAH 592: Research Project Seminar: Adult Health Nursing in the School of Nursing in The Graduate School, The University of Alabama at Birmingham

BIRMINGHAM, ALABAMA

Winter, 1989

Adult Health Nursing

Abstract

Flight nurses face a multitude of challenges in a wartime environment, not the least of which is the patient care they must be able to provide during transport. One of the problems noted in Vietnam was that most of the nurses lacked experience and/or adequate training and skills in caring for combat casualties. Can the same be said for flight nurses? The purpose of this study was to describe the knowledge level of Air Force flight nurses regarding the injuries of conventional warfare casualties.

A survey containing demographic information and a 30 question multiple choice test which included the major injuries predicted to occur in a future conflict was developed. One-hundred fifty surveys were sent to 15 arbitrarily selected AE units which were representative of all types of AE missions and included active duty, Guard, and Reserve. Ninety-two surveys were returned and used for data analysis. The sample was well-diversified.

A score of 24 (80%) on the test was considered passing and indicative of adequate knowledge levels of conventional warfare casualties. The mean score was 22.1 (73.8%). Only 35 (38%) of the subjects achieved a score of 24 or higher. These figures indicated the majority of the sample did not have a sufficient knowledge level of conventional warfare casualties; however, a mean of 22.1 also indicated at least some knowledge of these injuries.

None of the demographic variables except attendance at the Trauma Nursing Core Course, Advanced Trauma Life Support, and Joint Chiefs of Staff exercises had any impact on the scores. Those flight nurses who had participated in these activities scored significantly higher

than those who had not. Attendance at the Combat Casualty Care Course, Medical Red Flag, and the Battlefield Nursing Course did not increase scores. Test items covered a wide variety of injuries, and both deficits and strengths were noted in knowledge of specific types of military trauma. Recommendations included replication of this study to include more combat injuries, development of studies to evaluate the clinical components of medical readiness activities for nurses, and a standardized educational program geared towards the nursing management of conventional warfare casualties.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

Introduction

Throughout history, aeromedical evacuation of military combat casualties has demonstrated its value over and over again. Air transportation of the sick and injured has been recognized since the development of the airplane. Early on, however, efforts to use the airplane for medical airlift were regarded as unsafe and impractical. As aircraft design and performance improved, air evacuation became a reality and was used on a limited basis in World War I (Air Force Pamphlet 164-2, 1983).

During World War II, approximately 1,500,000 patients were airlifted and accompanied by inflight attendants. The Army Air Corps, assigned the responsibility for aeromedical evacuation, developed the concept of dual-purpose aircraft. After troops and war material were transported overseas, the aircraft was reconfigured and filled with patients for the trip home. This provided a speedy return of the wounded from the battlefield to hospitals in the United States (Air Force Pamphlet 164-2, 1983).

In 1949, the Department of Defense issued a new policy that stated ". . . in both peace and war, the movement of patients of the Armed Forces shall be accomplished by airlift if available and conditions are suitable for aeromedical evacuation, unless medically contraindicated" (Air Force Regulation 164-5, 1975, p. 1). The United States Army was assigned the responsibility for forward air

evacuation in the Army combat zone using Army aircraft. The Navy was given the responsibility for Naval and Marine combat areas, and the Air Force assumed the remainder (Air Force Pamphlet 164-2, 1983).

During the Korean conflict, aeromedical evacuation continued to expand its role. Helicopters transported the wounded directly from the combat zone to medical facilities behind the front line. Once they were stabilized, the patients were air transported to large medical facilities in Japan or to the United States.

While many new medical lifesaving technologies and procedures evolved from the Vietnam conflict, certainly one of the most important accomplishments was the rapid airlift of the wounded from the battlefield to behind-the-lines medical facilities. The introduction of jet aircraft for long-range aeromedical evacuation, the full use of helicopters for battlefield pick-up of casualties, and highly trained medical crews were largely responsible for a marked reduction in mortality (Neel, 1973).

Aeromedical evacuation in Vietnam was actually a complementary operation between the Army and Air Force, each continuing the movement of wounded until they reached a final destination medical facility. Army helicopters completed more than 104,112 aeromedical missions, either from the battlefield to a surgical hospital and/or to an evacuation hospital. These flights averaged 35 minutes each and the wounded usually reached a hospital within one to two hours after injury. Of those to reach the medical facilities, about 97.5% survived (Neel, 1973).

In the meantime, the Air Force provided all out-of-country aeromedical evacuation and some in-country. A total of 10,164

patients were moved in 1965. As the build-up of forces continued, so did the aeromedical evacuation missions. The numbers of patients moved increased from 5,813 per month between July, 1967 and January, 1968, to 9,098 monthly from March to June, 1968. Over 10,000 patients were evacuated by the Air Force in February, 1968, during the Tet Offensive (Neel, 1973).

The contributions of aeromedical evacuation towards the reduction of mortality and morbidity rates have been demonstrated repeatedly in theses conflicts. In World War II, 4% of battlefield casualties died; in the Korean conflict, the mortality rate decreased to 2%. During the Southeast Asia conflict, the mortality rate was reduced to 1% (Air Force Pamphlet 164-2, 1983).

The aeromedical evacuation mission continues to be a viable and important part of the Air Force's overall mission. Even in peacetime, flight nurses and medical technicians continue to train and transport patients. The mission is formally defined as,

> . . . to evacuate casualties from the combat zone to definitive care facilities. Preparation for this mission is accomplished during peacetime by exercising the command and control system, training crews, and testing equipment. A by-product of the peacetime mission is that authorized Department of Defense personnel are expeditiously moved between medical facilities to insure optimal patient care

(Military Airlift Command Regulation 164-1, 1982, p. 1).

The Air Force presently has over 1,600 flight nurses training for aeromedical evacuation. Some of these nurses (about 7%) are on active duty; the remainder are in the Air Force Reserve or Air National Guard. Training is extensive and begins with a six-week Flight Nurse Course. This course trains nurses for duty as a member of a medical crew in aeromedical evacuation (AE) units. The training includes the principles of altitude physiology, specific techniques necessary for safe and efficient transport of patients by air, life support principles, and survival skills (Air Force Regulation 50-5, 1987).

The Flight Nurse Course is followed by approximately nine months of unit training consisting of extensive education regarding the aircraft, emergency procedures, safety, and some patient care instruction. Actual flying on missions is also accomplished at this time, usually with simulated patients. Finally, the nurse receives an evaluation flight during which his or her competence at flight nursing is examined.

Despite all this training, there exists the distinct possibility that flight nurses may not have a realistic idea about the types of patients they will be caring for during air transport. One of the problems noted by Neel (1973) was that 60% of the Army nurses serving in Vietnam between 1965 and 1970 had been on active duty for less than six months and lacked experience and/or adequate training for combat nursing. Consequently, Vietnam became a training ground for a large number of inexperienced officers, and intensive training

programs were established by necessity. Can the same be said for Air Force flight nurses? While flight nurses generally have more than six months experience in the military, be it active duty, Reserve, or Guard, how much do they really know about combat casualties and the injuries of the patients? To the best of this investigator's knowledge, this has never been determined.

Purpose

The purpose of this study was to describe the knowledge level of Air Force flight nurses regarding the injuries of conventional warfare casualties.

Conceptual Framework

The very embodiment of flight nursing lies in Air Force Doctrine, the concept of medical readiness, the concept of aeromedical evacuation of casualties, and in nursing theory itself. These concepts provide a framework for an understanding of the problem and the purpose of this study.

Air Force Doctrine

All Air Force nurses are officers first, nurses second. Whenever a person is appointed or elected to an office of honor or trust under the government of the United States, they must take and subscribe to an Oath of Office. Part of the oath that nurses must subscribe to is ". . . that I will protect and defend the Constitution of the United States against all enemies, foreign and domestic; that I will bear true faith and allegiance to the same" (Title 5, United States Code 3331, 1983).

The basic objective of the Air Force is "to win the aerospace battle--to gain and/or maintain control of the aerospace environment

and to take decisive actions immediately and directly against an enemy's warfighting capacity" (Air Force Manual 1-1, 1984, p. 1-3). The United States Air Force Basic Aerospace Doctrine goes on to say,

> The Air Force has a primary function to train combat and support forces to ensure the conduct of prompt and sustained aerospace combat. To carry out this function, all Air Force training efforts must contribute to the fundamental preparation of aerospace forces for the effective prosecution of war. This dictates that training is a force-wide, continuous process of applying education, skills, and experience to the goal of producing a credible, cohesive warfighting team (p. 4-6).

The entire Air Force medical system (which includes nurses) is considered a support force for the actual combat forces.

> The United States Air Force Medical Service mission is to provide the medical support necessary to maintain the highest degree of combat readiness and effectiveness of the Air Force. All Air Force medical personnel have a specific wartime role during contingencies (Air Force Regulation 168-4, 1987, p. 5-1).

In other words, Air Force nurses exist to perform nursing for the combat forces. This is their contribution to the team-effort of supporting and sustaining the effectiveness of the Air Force.

Air Force flight nurses' contribution lies in the nursing care provided during air transport of combat casualties.

Aeromedical Evacuation

While it is not the intent to discuss the overall health service support of the Armed Forces in time of war, it is necessary for the reader to have some understanding of the AirLand Battle in order to see how aeromedical evacuation (AE) fits in. The AirLand Battle is essentially the operational doctrine used by the United States Air Force and Army which describes how they fight together to defeat the enemy. The role of medicine on the modern battlefield is four-fold: take care of the soldier, evacuate the sick and wounded from the battlefield, return soldiers to duty at the earliest time and at the lowest level in the chain of evacuation, and assist the combat commander in the execution of his responsibilities for the health of his command (Winkler, 1986).

From a wounded soldier's point of view, anything less than a fully equipped, immediately available hospital is not optimal care. If the medical facility cannot be brought to the soldier, the soldier is brought to it. This is where the medical system becomes unique on the battlefield. While other systems move to the tempo of the battle, the medical system is racing the clock to save life and limb (Winkler, 1986).

The goal of the evacuation chain is to move the patient back to a secure base for definitive care before complications set in. That last hospital in the theater evacuation chain may be in the United States, in which case the health services prepare the patient for a

24-hour bed-to-bed move. Those patients expected to return to duty are evacuated to a facility closer to the war zone (Winkler, 1986).

Casualty management includes all the successive agencies and installations engaged in the collection, treatment, transportation, and hospitalization of the sick and injured. Theater medical resources for casualty management are distributed among the services in levels called echelons. A theater of operations is that portion of an area of war necessary for military operations. It is divided into two zones: the combat zone where combat forces conduct operations, and the communications zone, which is the rear part of the theater and contains lines of communication and other agencies used for combat support (Hansell & Martin, 1987).

There are four echelons of care. The first echelon consists of emergency treatment performed by company aidmen in battalion aid stations. The second echelon provides initial resuscitative medical and surgical treatment, and limited psychiatric and dental care. Casualties who can be returned to duty are admitted; the rest are evacuated.

The third echelon consists of combat support hospitals or evacuation hospitals. Both provide surgical and medical treatment, and evacuation hospitals provide specialty care. If patients require further care they are evacuated to a fourth echelon care facility located in the communications zone. These facilities provide comprehensive care and rehabilitation of casualties to duty status within the time limits specified in the theatre commander's evacuation policy. Casualties unable to be rehabilitated within this period are evacuated to the United States (Hansell & Martin, 1987).

The theater evacuation policy is established by the Secretary of Defense, with the advice of the Joint Chiefs of Staff and theater commander. The policy states, in number of days, the maximum period of time that casualties may be held within a theater for treatment. The driving factor in establishing this policy is the number of beds in the theater in relation to the actual or estimated number of casualties (Hansell & Martin, 1987).

Casualty movement into the second or third echelons is the responsibility of the casualty's parent service. Movement from the second or third echelon to the fourth or back to the United States is normally accomplished by the Air Force. To provide this support, a three-tiered system is used beginning with tactical aeromedical evacuation from airfields in the combat zone to fixed hospitals in the rear of the combat zone or communications zone. The strategic system evacuates casualties from the communications zone to the United States. The third system, the domestic, redistributes the casualties throughout the United States (Hansell & Martin, 1987).

Three different aircraft are used for aeromedical evacuation. The C-130 supports the tactical mission, or the movement of casualties from the combat zone. It can carry a maximum of 74 litter patients, or 92 ambulatory patients, or a mixture of the two. The medical crew consists of two flight nurses and three medical technicians (Hansell & Martin, 1987). Unless a physician (Flight Surgeon) is onboard, the flight nurse acts as the senior medical authority and is responsible for the supervision of patient care and the medical crew. This is true of any medical crew on any aircraft (Military Airlift Regulation 51-164, 1986).

The C-141 is used for strategic aeromedical evacuation. Like the C-130, it is a cargo aircraft which can be reconfigured for AE. It can carry up to 103 litter patients or 160 ambulatory patients or a combination of the two. The medical crew again consists of two flight nurses and three medical technicians. Additional medical crew members can be added as patient condition's dictate.

The C-9, an aircraft specifically designed for AE, will move casualties within the communications zone. It can hold 40 litter patients or 40 ambulatory patients or a combination of the two. The medical crew consists of two flight nurses and three medical technicians (Hansell & Martin, 1987).

Redistribution of casualties within the United States will most likely be performed by the Civil Reserve Air Fleet, using an airplane called the MD-80. These aircraft are not expected to be available for AE until 1992 (Newell & Anderson, 1986).

Medical Readiness

The concept of medical readiness denotes the medical service's state of readiness for war and includes their abilities to survive and function in a disaster or wartime environment (Air Force Regulation 160-25, 1986). Medical readiness started in the post-Vietnam era with an increasing awareness among physicians that a significant number of them were unable, unwilling, or poorly trained in the care of acutely injured patients. War planners then discovered that medical personnel were so few in number that only one out of ten casualties would get care in the initial period of conflict. Further, the Air Force realized that in the next war they might not have a safe haven from which to launch and retrieve air

missions. Modern technology may have taken the air base into the range of initial conflicts--in other words, air bases could be on the front line (Yarrington, 1985).

The development of war plans which recognized the potential need for acute casualty care capability created the initial development of medical readiness programs. The fact that a significant proportion of medical personnel were neither trained nor inclined toward emergency medical care further demonstrated the need for education and planning (Yarrington, 1985).

Planning to correct these deficiencies commenced for both active duty and Reserve forces. In 1979, the PATCH TEAM (Train Each Air Force Member) plan was developed. This five-part plan included basic skills, Corps training, unit disaster training, line training, and formal training (Forrister, 1982).

Corps training evolved as the Medical Red Flag program. It is now required for all hospital personnel and includes didactic and hands-on training. Emphasis is on triage, immediate care of combat casualties, and field living conditions (Yarrington, 1985).

Formal training includes a Battlefield Medicine Course, Battlefield Nursing Course, the tri-service Combat Casualty Care Course (C4), and several others. Of importance to nurses are the C4 and Battlefield Nursing Course.

The latter course was instituted in 1982 and includes nursing care considerations and management of acute battlefield injuries, resuscitation with stabilization, trauma life support, and other emergency techniques (Air Force Regulation 50-5, 1987). Specific topics include abdominal trauma, burn management, combat psychiatry,

shock, orthopedics, chest trauma, suturing, and bandaging (Battlefield Nursing Course Lesson Plans, 1987). This course is required for all nurses going overseas.

The C4 course is open to dentists, nurses, physicians, and medical service corps officers. It provides training in skills necessary for medical support of tactical units under combat conditions. The curriculum includes combat forces training, communications training, AE operations, medical training in podiatry, triage, bandaging and splinting, preventive medicine, psychiatry, field dentistry, management of fractures, and advanced trauma life support (Combat Casualty Care Course Lesson Plans, 1987).

Flight nurses in AE units receive basic medical readiness training upon entering the Air Force, Medical Red Flag training, and if overseas, have attended the Battlefield Nursing Course or C4. Additionally, they receive cardiopulmonary resuscitation, unit disaster training (includes management of nuclear, biological, and chemical warfare casualties), combat arms training, chemical warfare defense training, mass casualty training, instruction on the Geneva Convention provisions and laws of armed conflict, and various other training within their assigned units (Air Force Regulation 160-25, 1986). All these training requirements apply to active duty, Guard, and Reserve flight nurses. Additionally, flight nurses may have the opportunity to participate in simulated wartime exercises.

Nursing Theory

Dorothea Orem's theory of nursing is based on the concepts of self-care, self-care deficits, and nursing systems. To understand how this theory contributes to the framework for this study, it is

necessary to provide a brief overview of its basic constructs. As defined by Orem (1985), "Self-care is the practice of activities that individuals initiate and perform on their own behalf in maintaining life, health, and well-being. Normally, adults voluntarily care for themselves" (p. 84).

Self-care agency is the complex acquired ability to meet one's requirements for care; it varies with age, health state, education, and life experiences (Orem, 1985). Self-care deficits refer to the relationship between the self-care agent and the self-care needs of the individual in which capabilities for self-care are limited. A self-care deficit that is health-related identifies the need for nursing (Orem, 1985). For example, a casualty with a chest injury can no longer ensure that he gets enough air, and possibly water and food. Because of his injury, he cannot provide his own self-care which constitutes a self-care deficit and results in a need for nursing.

There are three nursing systems designed to meet the self-care deficits of the patient. The first of these is wholly compensatory, in which the patient has no active role in the performance of care (Foster & Janssens, 1985). A nurse caring for an unconscious head injury patient must ensure all his needs are met.

The partly compensatory nursing system involves both the nurse and patient in the performance of care measures (Foster & Janssens, 1985). The patient does as much as he can, and the nurse assists or accomplishes the care that the patient cannot do. In the supportive-educative system, the patient is able, or can and should learn, to perform the required self-care but cannot do so without assistance.

Nursing provides assistance through support, guidance, and teaching (Foster & Janssens, 1985).

Nursing's special concern is the individual's need for self-care action and its provision and management in order to sustain life and health, recover from disease or injury, and cope with their effects. The specialized knowledge, skills, and attitudes of nurses reflect their abilities to perform therapeutic self-care actions for patients in need. Nurses' roles become specific in actual nursing situations by their knowledge of how and why a patient can and should be helped through nursing (Orem, 1985).

Nurses' knowledge of nursing and their capabilities for effective performance will be determined by the forms and quality of their education as these relate to their individual capabilities, interests, and concerns. Nurses quickly learn from daily experience that the desire to help another person does not mean that they have the ability to do so (Orem, 1985).

Further, it can be said that, "no nurse can be expert in all types of nursing situations" (Orem, 1985, p. 169). Special situations require special knowledge and skills. Legal restrictions imposed by nursing licensure also limit what a nurse can do. Both of these factors determine a nurse's response to the nursing requirements of the patients, capabilities for nursing practice, and the nurse's expertise in particular types of nursing situations (Orem, 1985).

Orem (1985) describes eight dimensions for which nurses must regulate their practice. Some dimensions are not applicable to flight nurse practice. Those that are applicable include: (a) the number of persons to be provided with nursing in relation to nursing

requirements; (b) the types of nursing systems to be used; (c) time and duration of nursing; and (d) the place where nursing will be provided. Nurses have been and continue to be viewed as being without limits with respect to the numbers of patients they can care for and the kinds of problems they can solve. The limitations on what nurses can do, established by their preparation for nursing and their experiences, have largely been ignored in practice settings. Consequently, a nurse's decisions about what he or she can realistically do is the first step in regulating practice. A second step is the nurse's own examination of his or her capabilities for providing nursing. A third step involves identifying directions for self-improvement in nursing practice. Nurses must ask and answer questions about their own nursing capabilities, and guide their individual development as nurses (Orem, 1985).

Consider the Vietnam nurses who did not know what combat nursing was all about. Granted, most were newly graduated. Now consider flight nurses, most of whom have some experience in nursing. Have they had (and retained) the education they need to effectively practice nursing with combat casualties? Based on the above theoretical discussion, it appears that the professional practice of nurses for specific patients is a combination of education and the nurses' abilities to apply that education. Air Force flight nurses pride themselves on being professionals. Each nurse who is achieving professional standing in practice should be aware of what he or she knows and does not know, and what he or she is qualified or not qualified to do in nursing (Orem, 1985). Since the primary mission of flight nurses is the care and transport of combat casualties, they

have the professional responsibility to know about the care of these casualties. Perhaps this responsibility for education is shared between the Air Force and the nurses themselves.

Air Force flight nurses are a part of something much larger than nursing. Upon their commissioning as officers in the United States Air Force, they pledged themselves to the support of the combat forces. This support took the form of aeromedical evacuation of combat casualties. In order to fulfill their commitment to the Air Force, they must be ready to survive and function in a wartime environment, as well as be ready to care for and transport combat casualties. As nurses, they are professionally responsible for identifying and choosing the best system of nursing care for these casualties, for recognizing their own capabilities, and for overcoming any limitations via education.

Problem

In this study, the problem investigated was: what is the knowledge level of Air Force flight nurses regarding the injuries of conventional warfare casualties?

Definition of Terms

For the purpose of this study, the following operational definitions of terms are presented:

Air Force flight nurse: A United States Air Force (USAF) Nurse Corps officer who has completed the Flight Nurse Course and is assigned or attached to an aeromedical evacuation unit (Military Airlift Command Regulation 51-164, 1986). These registered nurses have been on flying status for at least one year.

Injury: Hurt or damage to the human body.

Conventional warfare casualties: Military trauma victims as reflected through multiple choice items utilized in the instrument for this study. The trauma results from weapons of conventional warfare, such as bullets, shrapnel, grenades, rockets, flames and so on (as distinguished from chemical, biological, or nuclear warfare weapons and casualties).

Knowledge levels: Refers to a score obtained on the instrument constructed for this study. A score of 80% is considered passing.

Assumptions

In this study, the following statements were assumed to be true:

1. All flight nurses have participated in medical readiness training at least one time.

2. Flight nurses have some knowledge of conventional warfare casualties.

3. All flight nurses have attended the Flight Nurse Course.

4. Flight nurses have varied nursing backgrounds based on their past experiences and specialties.

5. In the event of a conventional war, flight nurses will have to transport casualties.

6. The instrument accurately measures the nurses' knowledge of injuries of conventional warfare casualties.

Significance of the Study

Air transportation of combat casualties with different diagnoses pose unique problems for a flight nurse. Flight nurses come from varied nursing backgrounds, and in today's world, most nurses have become highly specialized. Determining their knowledge level of the injuries of combat casualties may further enhance medical readiness

training. The findings from this study may be especially useful to flight nurses in charge of unit training programs as they are in positions to institute new and improved curriculums.

The knowledge gained from this study could also potentially lead to changes in the Flight Nurse Course. In addition, the findings will enhance the Air Force Nurse Corps' body of knowledge as no study such as this has previously been conducted to this nurse's knowledge.

Summary

The importance of the aeromedical evacuation mission in the overall health care system of the Armed Forces has been discussed, both for past wars and for any future conflicts. Flight nurses face a multitude of challenges in a wartime environment, not the least of which is the patient care they must be able to provide. Are they ready and do they know about the injuries of conventional combat casualties?

Patient census per aircraft could range from 40 to over 100 during war. Realistically, it is impossible for flight nurses to learn everything about each type of injury that could be seen during AE. However, as indicated by nursing theory, it is important that flight nurses possess the education necessary to conduct nursing in specific situations with specific patient populations. This means they should at least have general knowledge of multisystem trauma and the most frequent types of injuries that are predicted to occur in a future war.

As John Beary, former acting Assistant Secretary of Defense, stated,

> . . . unless we ensure the adequate care of our wounded in wartime, we cannot call ourselves medical or military professionals. But the task of attaining readiness is far from easy, and it is made far harder by those who are ready to assume that all is well because disaster hasn't happened yet (1984, p. 181).

It has been said that the next war will be a "come-as-you-are-war" (Forrister, 1982, p. 4). Proper training and education in peacetime can eliminate on-the-job training in wartime.

CHAPTER 2

Review of Literature

Applicable research reported by nurses was nonexistent. However, numerous publications relevant to conventional combat casualties, medical readiness, nursing experiences in Vietnam, and aeromedical evacuation (AE) in Vietnam were discovered in the literature. Some of these articles and publications will be reviewed in this chapter in further support of the theoretical framework and problem for this study.

Medical Readiness

A search of the literature revealed very little about nursing needs or training for medical readiness. However, many articles and some studies were found that addressed this concept for other health professionals.

In 1981, Terry conducted a study on medical wartime training programs for physicians of the Armed Forces. His framework was military medicine, which is the development within the art and science of surgery that carries out a specialized, essential, and highly significant mission under the adverse conditions of war (United States Department of Defense, 1975). The Department of Defense (1975) in their NATO Handbook discusses military medicine in such a way that may also be applicable to military nursing:

> Success in military medicine, furthermore, has been achieved despite the fact that, over the ages, many--sometimes most--of the lessons of the past, all learned by hard experience, ordinarily lie fallow between conflicts. Almost invariably, they have had to be rediscovered, relearned by additional hard experience, and expanded and adopted by succeeding medical generations as new generations have arisen (p. 2).

Terry (1981) compared physician training programs, specifically Medical Red Flag, Battlefield Medicine, and the tri-service Combat Casualty Care Course (C4), to determine their effectiveness and whether they contributed to joint operations. Course documents and inputs from course administrators were used to evaluate the purpose, course content, schedule, and participants. Terry (1981) also identified curriculum subjects which were common core, service specific, and contributed to joint medical service support operations. Course evaluations and student test results were also reviewed.

Findings showed that each course was conducted and managed in an effective and cost efficient manner, and met physician needs as described in the course purpose. Eleven recommendations were offered, one of which was to review all medical wartime readiness training programs for physicians to determine a training course model for all health professionals. Another recommendation was to develop a system which improved the corporate memory of wartime medical

procedures and training in order to prevent relearning of expensive lessons from the past. The author felt this loss of corporate memory was due to lack of reading of military medical histories, loss of trained military medical personnel between and during wars, lack of updated training systems, and lack of a central repository where information could be retrieved quickly. Terry (1981) concluded that students at Air War College (who are senior officers) did not have an accurate conception of casualty rates in future wars, and that the military must prepare for war in time of peace.

Weiner (1986) performed a similar study and review of the wartime readiness of the Medical Corps. Some of the problems identified were: (a) training focused on initial trauma life support and did not cover accompanying sequela such as amputations, infectious diseases, multiple organ failure, and increased intracranial pressure; (b) there was no provision for periodic written or practical testing of essential military medical skills; (c) Reserve physician training consisted of mass casualty drills in which only a few physicians generally participated; (d) active duty physicians in nonsurgical specialties saw little complex trauma; and (e) successful completion of the Advanced Trauma Life Support component of C4 was not required for course credit.

Weiner (1986) had many suggestions to solve these problems, especially increasing the education for the management of various injuries and infectious diseases. The author also suggested that training should be instituted at medical facilities, and trained physicians should train physician assistants, nurses, and medical technicians. Veterans Administration physicians and civilian

physicians from hospitals participating in the Civilian Military Contingency Hospital System (those hospitals making beds available for military use in time of major conflict) also needed casualty management training. Weiner (1986) felt that C4, Battlefield Medicine, and Medical Red Flag were excellent introductory courses, but innovative programs for refreshing and expanding knowledge were needed to maintain Medical Corps readiness.

While the number of active duty health professionals are generally sufficient to maintain peacetime medical care, these numbers are inadequate to support the expected combat casualty care demands of war. To overcome these deficiencies, the active duty forces will be augmented with Reserve and Guard personnel. In the case of AE, approximately 92% of AE crews will be supplied by the Guard and Reserve. Medical readiness training is a major concern for these forces as well.

Hepps et al. (1985) described a combat casualty course for increasing the operational readiness of Reserve component health care professionals. The course was presented to 50 Army National Guard and Reserve medical, dental, and nurse corps officers during a weekend drill. Lectures included trauma, AE, and surgical lab training in the management of combat casualties. The authors noted that most of the current Reserve corps health care professionals had never experienced combat and many had no training in trauma. Civilian medical professionals were accustomed to devoting maximum effort and resources to saving a single life, while the military focused on the necessity of rapid triage and treatment to save the most lives with limited resources. The course was considered a success and further increased the Reserves' readiness.

Pohlman, Reynolds, and Zimmerman (1986) described a tri-service school they established in order to train Reserve medics in combat critical medical skills in Wisconsin. The collaboration between Reserve medical units and civilian schools involved in paramedic and emergency medical technician training proved very effective for them.

AE Reservists have participated in many large Joint Chiefs of Staff exercises in preparation for their wartime roles, as well as taken part in actual emergencies. Shy (1984) described Reserve AE participation in evacuating casualties from Grenada. Those missions served to heighten medical readiness for both active duty and Reserve AE crew members.

Several other articles on Reserve medical readiness were reviewed, as well as some addressing the medical readiness of dentists and the medical students at the Uniformed Services University of the Health Sciences. Only one study was found concerning the medical readiness of nurses. In an unpublished Master's thesis on Navy nurses, Laurent (1988) found that 55% of the sample had inadequate knowledge in the triage of thermonuclear casualties. Seventy-five percent of these nurses had attended some form of combat care training. Laurent (1988) concluded that this inadequate knowledge level could be directly responsible for increasing the unnecessary loss of life, and suggested further studies and evaluation of training programs.

Casualties from Past Wars

A study on the epidemiology of military trauma was done by Bellamy, Maningas, and Vayer (1986). Their purpose was to show that

the epidemiology of military trauma differed from civilian trauma in several aspects. Data was drawn from a United States Army study that described 8,000 casualties in Vietnam from 1968-1969. Ninety-six percent of military casualties were injured by penetrating missiles. Blast and thermal injuries accounted for the remaining four percent. Blunt trauma, so common in the civilian setting, was rare; fragmentation injury occurred much more frequently in the military setting. In fact, 80% of all casualties evacuated from the battlefield had fragment wounds produced by artillery and mortar shells, bombs, rockets, mines, and grenades. Bullet wounds were more lethal and caused a disproportionately larger number of deaths.

Vietnam was the first American war in which central nervous system trauma was not the leading cause of death. The reason is unknown. The authors of this study also noted that little change had occurred in the overall combat mortality from previous American wars, despite well-recognized improvements in trauma management. This may be because the great majority of the killed in action have never been, and probably never will be salvageable. Military trauma, in comparison to civilian trauma, seems to have an all-or-none nature. One is either killed outright or sustains a survivable injury. In addition, military trauma management differs from that of the civilian sector because civilian trauma centers are not expected to move 25-50 miles every few days, nor are their personnel subject to being killed on the job (Bellamy, Maningas, & Vayer, 1986).

Another study by McCaughey (1987) described the casualties who died while being treated at the Naval Support Activity Hospital in DaNang, Vietnam, compared with those who survived. A total of 8,430

wounds were recorded for 2,021 admissions. Lower extremity wounds occurred most frequently (40.5%), and extremity wounds in general accounted for more than half of all injuries (68.2%). Head injuries accounted for the greatest number of non-salvageable deaths (66.7%). Overall, 22.6% had at least one penetrating wound to the head, thorax, abdomen, or a combination of these. These injuries tended to be lethal--only seven of the 59 deaths did not have a penetrating injury. Of interest were the 21 patients who died after AE; many were due to some sort of septicemia (McCaughey, 1987).

It is now accepted that if a soldier can be brought into a surgical hospital alive, he will very likely survive his wounds. In Korea, 17,000 out of 50,000 died of their wounds; in Vietnam, 8,500 of 50,000 died of wounds (Cammisa, 1986). The evolution of high-explosive weapons introduced mass casualty production by fragmentation. High-explosive weapons wound more men than they kill, and have incredible wounding power. Flame weapons, such as napalm and Soviet "liquid fire" have produced massive burns (Cammisa, 1986).

Prior to World War II, environmental agents put more troops out of action than wounding agents. With the introduction of antibiotics in the 1940s, this trend was reversed. However, in Korea and Vietnam, malaria, dysentery, and other endemic diseases were quite prevalent. Depending on region, heat and cold injuries have also been common (Cammisa, 1986).

The psychological problems of combat are considered one of the most complex areas of combat medicine. Although each man is different, it has been estimated that a combat soldier can only withstand approximately 200 days of continuous action before becoming a psychiatric casualty (Cammisa, 1986).

Vietnam Nursing

Dewane (1984) reported on posttraumatic stress disorder (PTSD) in medical personnel in Vietnam and was one of the first to write about health professionals and nurses in any capacity. It was noted that those in the health professions had unique characteristics of PTSD stemming from their constant exposure to death. War connotes death and medicine implies life--the exposure to trauma and the intensity of stress endured by medical personnel in Vietnam was extraordinary.

McVicker (1985) reported on the women who served in Vietnam, and commented that neither the experiences or issues of women veterans had been addressed publicly. None of the large Vietnam studies had included women. One reason for this perhaps was that these women were just now beginning to identify themselves and talk about their experiences. About 7,500 women served in Vietnam and the majority of them were military nurses.

While McVicker (1985) also examined the PTSD found in some of these nurses, she also commented on the experiences these nurses had. First of all, the injuries in Vietnam were more severe than those seen in today's metropolitan emergency units. The percentage of persons having lower extremity amputations was 300% higher than in World War II and 70% higher than in Korea. Paraplegia was 1000% higher than in World War II and 50% higher than in Korea. In general, it was the nature of the wounds, the number of casualties received during periods of heavy fighting, and the youth of those casualties that were a large part of the troubling memories the nurses reported. In addition, malaria and typhus were common among

the American troops while cholera, plague, and leprosy were prevalent among the Vietnamese military, civilian, and prisoners of war the nurses cared for. The nurses also reported feeling ill-prepared to handle psychiatric casualties (McVicker, 1985).

Care of the casualties was not limited to military nurses stationed in Vietnam. Air Force flight nurses took those casualties to medical facilities in Japan and other locations within the Pacific. These nurses, along with those at the receiving hospitals, experienced the same feelings as their counterparts in Vietnam. Survivor guilt, anger, and depression were still apparent among the nurses, and some still believed their actions or inactions caused the deaths of others (McVicker, 1985).

Schwartz (1987), an Air Force nurse in Japan from 1968-1971, published an excellent article on women and the Vietnam experience, again focusing on nurses. She stated that records of military assignments to Vietnam were inaccurate, and that the exact number of nurses serving there was unknown though the figure was estimated at 11,000. Flight nurses were not assigned to Vietnam and were not included in this number. Until 1968, all flight nurses flying in-country AE missions were male. Schwartz (1987) also mentioned that none of the many articles and books written on the Vietnam war included women or nurses.

Military nurses (both male and female) identified the dangers of living in a war zone, caring for battle casualties, and the negative reactions on returning from Vietnam as the most stressful aspects of war. Taking care of the casualties was especially difficult because of their youth (average age was 19) and because of the severity of

the injuries. The Vietnam war was largely fought with small arms, such as booby traps, claymore mines, and high velocity bullets, all of which caused mutilating wounds. Napalm and phosphorus complicated the injuries with massive burns. Adding further to these traumatic injuries were hepatitis, blackwater fever, and malaria. As indicated by Neel (1973) and Schwartz (1987), many of the nurses had barely completed nursing school before going to Vietnam, which meant they had to acquire clinical skills while being responsible for these patients with devastating injuries.

As for flight nursing, C-130 and C-141 aircraft routinely carried 40-60 litter patients and 40 or so ambulatory patients. The crew consisted of two flight nurses and three medical technicians. Nurses wore (and used, if necessary) sidearms in unsecured pick-up areas. The flight from Vietnam to Japan took four to six hours, during which time the flight nurses were the senior medical authority onboard. The environmental and physiological changes of altitude could completely alter a patient's condition, and complications could quickly set in. Sometimes, the flights were filled with unstable patients in order to keep in-country beds free during periods of heavy fighting. Some of the patients died enroute (Schwartz, 1987).

Because the AE network was strung out over the Pacific and into the United States, the receiving medical facilities were all affected by the casualties. As Schwartz (1987) wrote, ". . . many agree that nothing would ever compare with the trauma and mutilations, courage and grit, they saw in the casualties of the Vietnam war" (p. 172).

A study of 137 Vietnam nurses was done by Paul (1985) to identify stressors and after-effects of these nurses. The sample was drawn

from a request for participation published in military newspapers and nursing journals. The majority of respondents (58%) were 20-24 years old when in Vietnam, and 80% were in the Army, 9% in the Navy, 7% in the Air Force, and 4% were civilian. Flight nurses were included. Forty-nine percent of these nurses were still on active duty.

The investigator identified eight major stressors or problems that the nurses experienced in Vietnam and 14 adverse after-effects experienced upon returning home. The stressors were: (a) the short time in service prior to going to Vietnam; (b) the enormous number, youth, and severity of casualties for whom they cared; (c) nurse's roles in specific patient care areas; (d) lack of supplies; (e) sexual harassment; (f) problems with some professional relationships; (g) survivor guilt; and (h) threat to life. After-effects included depression, anxiety, anger, relationship problems, substance abuse, flashbacks, disturbed sleep patterns, and avoidance of activities that aroused memories.

Again, the casualties were a stressor. Because of helicopter evacuation, nurses saw more severe trauma than they would have in previous wars, when severe casualties would not have survived long enough to be cared for by nurses (Paul, 1985).

Other articles also explored nurses' experiences with traumatic casualties (Odom, 1986; Rogers & Nickolaus, 1987). One in particular (Marshall, 1987) described not only the experiences of Vietnam nurses, but also those of a flight nurse named Lt. Col. Marsha Jordan. This nurse flew in and out of Vietnam with the 56th Aeromedical Evacuation Group from August 1969 to August 1971. Lt. Col. Jordan stated,

> Some of the ambulatory patients did not require that much care most of the time, but you still had to watch them for complications. We were seeing a lot of amputations of all extremities and a lot of fractures. Some of the biggest things were fractures caused primarily from shrapnel and bullet-type injuries. We were also seeing burns, a significant number of burns. We had a lot of abdominal injuries, where they received shrapnel wounds, gunshot wounds to the abdomen, and we had lung problems, respiratory problems, due to chest wounds (Marshall, 1987, p. 162).

It was also noted that most of the nurses never actually saw the wounds, because they seldom removed the dressings. The aircraft was considered a dirty environment and if one changed a dressing, the chances of infection were increased.

Lt. Col. Jordan (Marshall, 1987) also described various missions, some of which were good, some were depressing. Her life was always busy, and she was always working. Particularly memorable for her were the trips back to the United States because the patients were overjoyed to be going home.

Review of Aeromedical Evacuation

The first article to be reviewed was a synopsis of lessons learned from the Southeast Asia operational aeromedical support mission (United States Air Force School of Aerospace Medicine, 1975).

Comments varied concerning both in-country and out-of country AE operations, and ranged from praise to condemnation. Higher level supervision of AE was considered poor, but the people conducting the missions were praised. Aeromedical support was noted to be frustrating for hospital commanders with nonacute battle casualties, and very responsive to acute battle casualties. Once aeromedical staging flights (holding facilities for patients) were in place, the system appeared to operate much more effectively.

The 9th Aeromedical Evacuation Group in the Republic of the Philippines was described as a very patient-oriented unit. Patients lying in wait on a hot ramp were perceived as a problem. An Army participant in the review commented that the system worked well in helping control the number of patients in Army beds in Vietnam, but felt that on some flights, patient care was not at optimal levels. For example, doors had remained open for up to two hours in winter and patients had only one blanket. A need for further evaluation of the stresses involved in transporting patients long distances was recommended in order to determine how stressful a trip was for a patient (United States Air Force School of Aerospace Medicine, 1975).

Another study (Project Corona Harvest, 1968), examined the case records of 3,987 trauma victims evacuated from Vietnam during the period of 8 July to 8 September, 1968. Not all records were complete which limited the quality of the data, yet some interesting information was collected.

The mean age of the entire group was 21.8 years. Sixty percent were Army, 35% were Navy, 1% were Air Force, and the remainder of the patients were civilians or foreign nationals. The most common agents

of injury were fragmentation devices of various types, and the most common type of injuries were soft tissue injuries. Half the group had casts, intravenous lines, and tubes of some sort. Seventy-five percent of the patients were on litters, one percent were unconscious, and seven percent were considered critically ill (Project Corona Harvest, 1968).

The mean time of departure from Vietnam was just under seven days after injury, and mean time of departure for the United States was 21 days after injury. Twenty patients (0.5%) died during the study. The Air Force had the highest percentage of burns, and the Army had the highest percentage of vascular injuries. Injuries were of the following types:

1. Burns--174 patients. Over 20% of this group was seriously ill and they had a high death rate. Forty percent were moved to the United States, usually on the 14th day post-burn.

2. Chest injuries--694 patients. These patients had either soft tissue or vascular injuries to the chest.

3. Abdominal injuries--489 patients. These patients had either soft tissue or vascular injuries of the abdomen. They had a high incidence of supporting appliances, especially intravenous lines and nasogastric tubes.

4. Fractures--1,471 patients. These patients had one or more fractures. Sixty-six had their jaws wired, but only one had problems with air sickness and vomiting, and had to have the wires cut. Half of these patients were evacuated to the United States for long-term rehabilitation.

5. Soft tissue injuries--no number given. These patients

included those with a soft tissue injury to a single extremity and those with soft tissue injuries to more than one extremity or other parts of the body. Fractures and burns were eliminated from this group.

6. Vascular injuries--562 patients. Of these, 25% also underwent an amputation. Many of these patients were considered critically ill and had a high death rate.

7. Amputations--253 patients. These patients were in addition to those listed above. Most were critically ill, and six of them died.

8. Head injuries--333 patients. Of these, 27% were considered critically ill, 8% were unconscious, and 1.5% died.

The report concluded that the AE system moved large numbers of seriously injured patients efficiently, effectively, and safely. Many were moved early after wounding and with appliances or conditions which presented problems for the medical crews. The study showed very little evidence of any adverse effects of the evacuation process on the patients (Project Corona Harvest, 1968).

Summary

Since no similar studies of the one proposed for this investigation were available, a review of pertinent literature was conducted. Medical readiness literature seemed to focus on physicians and a few other health professionals as well as on the concept itself--very little was written about nursing needs and concerns in this area. Even so, the literature indicated an express interest in the quality and types of medical readiness training for health professionals.

A great deal of time was spent reviewing information from Vietnam, including the types of casualties, nursing experiences, and aeromedical evacuation. These three areas actually complement and build on each other, as one tries to get a feeling for the nursing care required for conventional warfare casualties. From the literature, it can be determined that nursing (including flight nursing) was challenging as well as physically and emotionally demanding. The severity and number and youth of the casualties was mentioned repeatedly. Nurses commented occasionally on specific injuries and diseases, as did other studies devoted to casualty causes and statistics. This information can provide clues for today's flight nurses as to the nature of conventional warfare casualty injuries and what they can expect to see on their missions.

As was previously mentioned, military medical personnel tend to forget lessons learned in previous wars. War planners have estimated that 45,000 Air Force personnel will need care in the first week of a conventional war. The Army and Navy face similarly discouraging projections (McHail, 1987). Many of these casualties will require aeromedical evacuation and expert nursing knowledge. Do Air Force flight nurses know what they need to know about these casualties as they transport them all over the world?

CHAPTER 3

Methodology

This chapter presents the methods employed in describing the knowledge level of Air Force flight nurses regarding the injuries of conventional warfare casualties. The approach to measuring this knowledge, the method of data collection, and analysis of information are discussed.

Design of the Study

The research design for the study was descriptive. The primary objective was to describe flight nurses' knowledge level of the injuries of conventional warfare casualties.

Instrumentation

A survey containing demographic information and a 30 question multiple choice test was developed by the investigator (see Appendix A). A cover letter attached to each survey explained the purpose of the study, respondent's voluntary participation, and assurance of complete anonymity in data use (see Appendix A). A copy of the findings was made available at the request of participants.

Demographic data were carefully selected in order to describe the sample, and to ascertain past and present nursing experiences and medical readiness courses which might have assisted the respondents with the knowledge test. Patient injuries and content for the multiple choice test were derived from two sources: casualty information from the Vietnam war, and from a list of 344 diagnoses

that predict the types of injuries that will be seen should a war erupt in the future.

The top 40 of these diagnoses were requested and received from the Academy of Health Sciences, Fort Sam Houston, TX. These diagnoses were developed from historical warfare statistics by a tri-service committee comprised of physicians, nurses, and medical planners. Most of the diagnoses consisted of multiple trauma, such as "multiple fragment wound of the chest with pneumohemothorax, soft tissue injury to upper limbs, and penetrating wound of brain" (United States Department of Defense, 1987, p. 182). Since it was virtually impossible to construct one question covering all these injuries in one patient, the diagnoses were broken down into manageable categories such as chest wounds and head wounds.

The questions and answers were derived from several clinical sources such as The Lippincott Manual of Nursing Practice (4th Ed) (Brunner & Suddarth, 1986), Shock Trauma Care Plans (Strange, 1987), Emergency War Surgery: First United States Revision Emergency Surgery NATO Handbook (United States Department of Defense, 1975), and Trauma Management for Civilian and Military Physicians (Weiner & Barrett, 1986). Participants were instructed to answer each question by choosing the best response out of three possible choices. A "don't know" response was also provided to prevent guessing and was counted as an incorrect answer in the scoring.

A score of 80% (24 correct answers) was considered passing. Telephone calls to Air University faculty and several Air Force nurse educators revealed that there apparently was no standardized passing test score in the Air Force. Passing scores generally ranged from 60-

95%. The Navy uses 85% (Naval Health Education and Training Command, 1982). Gronlund (1973) felt that 80-85% was a realistic standard for multiple choice tests, and those percentages could be adjusted as experience dictated. Based on all these factors, a passing score of 80% was deemed reasonable and within the Air Force passing range.

The instrument was reviewed by trauma nursing experts and pretested by five flight nurses. Two of these flight nurses were on active duty and three were in the Reserves. All had been flight nurses for at least four years. Their mean score was 21.4 (71.3%), with a range of 19-25 points. The trauma nursing experts and the five flight nurses offered several suggestions for improvements to the test, and modifications were made accordingly. They also stated that the tool would accurately measure the desired knowledge level. One flight nurse commented that the test was difficult but fair, and if nurses didn't know the answers, they were not prepared to transport casualties. No formal reliability and validity tests were conducted on the instrument.

Subjects

The target population for this study was Air Force flight nurses currently assigned to aeromedical evacuation (AE) units. Fifteen AE units were arbitrarily selected to participate from among the total 35 units. Random unit selection was not performed in order to ensure a representative sample from among active duty, Guard, and Reserve units, as well as to ensure representation from C-9 (domestic), C-141 (strategic), and C-130 (tactical) units. Of the 15 units selected, four were active duty, three were Guard, and eight were Reserve. Three of the units had domestic missions, three had strategic

missions, and eleven units had tactical missions. These units were considered representative by the investigator because the majority of AE units have a tactical mission. Two of the active duty units flew all three missions, and one flew both tactical and strategic missions. The AE units were located throughout the United States and overseas.

The projected sample size was 150 flight nurses, ten from each of the 15 units. These nurses were arbitrarily selected by their Chief Nurses. A true random sample was not possible because of the difficulties involved with obtaining names and addresses of the flight nurses due to Privacy Act restrictions. Chief Nurses were requested to distribute surveys to a representative group of nurses of varying rank and experiences (see Appendix B).

All selected flight nurses were commissioned officers in the United States Air Force and were licensed to practice nursing. Each nurse had been on active flying status for at least one year.

Procedure

In order to comply with regulations established by the Department of the Air Force for the conducting of research, the research proposal, survey, and cover letter to respondents (which must contain a statement informing them that their participation is voluntary) was submitted for approval. The Air Force Institute of Technology was the approving authority and assigned a Survey Control Number and expiration date (see Appendix C). Approval was also obtained from the University of Alabama in Birmingham Institutional Review Board (see Appendix D).

A package containing ten surveys was then sent to each of the 15 selected unit's Chief Nurses. A letter to each Chief Nurse was included to explain the project and request their assistance in the distribution of the surveys (see Appendix B). The Chief Nurses were also provided the opportunity to request a copy of the study's findings upon completion.

A stamped, self-addressed envelope was attached to each survey. Subjects were requested to return the completed survey within two months. An extended time period for survey completion was deemed necessary because overseas mail is often delayed (two active duty units were overseas), and because Guard and Reserve units meet only once a month.

Analysis

Frequency distribution was employed to organize the data. Measures of central tendency were also determined, as well as the number of participants who passed and failed the test. Demographic variables were compared to test scores.

Limitations

The limitations in this study were:

1. Potential for subjects to obtain external assistance in completing the test.
2. Potential for poor response from subjects based on the survey method selected.
3. Potential for measurement error in data analysis.
4. Inability to generalize findings to the entire flight nurse population because subject selection was not truly random.

5. While the instrument was as comprehensive as possible for 30 questions, it did not reflect all the injuries that could occur in a future war.

CHAPTER 4

Presentation of Data

The purpose of this study was to describe the knowledge level of United States Air Force (USAF) flight nurses regarding the injuries of conventional warfare casualties. Chapter 4 presents the results of the study.

Description of Subjects

Of the 150 surveys mailed out, 92 (61.3%) were returned and used for data analysis. Table 1 presents the demographic profile of the respondents. The mean age was 34.7 years, with ages ranging from 27 to 48. Length of service for the subjects averaged 8.7 years, with a span of 1.5 to 22 years.

Length of nursing practice varied from 2.5 to 25 years, with a mean of 11.2 years. Flight nursing practice averaged 4.8 years, with a range of 1 to 22 years. Fifty percent of the sample had completed the Flight Nurse Course between 1984 and 1987. The remaining 50% completed this course between 1966 and 1983.

Clinical practice areas were diversified with the largest number of nurses (32) reporting full-time flight nursing. The second highest reported clinical areas were critical care and emergency nursing, each with 11. Ten nurses reported more than one clinical area, such as education or quality assurance. For the purposes of this study, one area only was arbitrarily selected and reported in Table 1.

Table 1

Demographic Profile of the Subjects

Characteristics	Sample[a] f(%)
Sex	
Male	26(28)
Female	66(72)
Age	
25-29	10(11)
30-34	37(40)
35-39	30(33)
40-44	11(12)
45+	4(4)
Length of Service in Years	
1-4	19(21)
5-9	40(44)
10-14	17(18)
15-19	12(13)
20-24	4(4)
Length of Nursing Practice in Years	
2-6	19(21)
7-11	39(42)
12-16	19(21)
17-21	7(8)
22-26	7(8)
Note. Only 91 of 92 reported.	
Length of Flight Nurse Practice in Years	
1-4	62(69)
5-8	16(18)
9-12	4(4)
13-16	3(3)
17-20	3(3)
21-24	2(2)
Note. Only 90 of 92 reported.	

(table continues)

Table 1 (continued)

Characteristics	Sample[a] f(%)
Area of Clinical Practice	
Medical/Surgical	8(9)
Critical Care	11(12)
Oncology	1(1)
Management	2(2)
Flight Nursing (full-time)	32(35)
OR/RR	6(7)
Pediatrics	1(1)
Orthopedics	2(2)
Anesthesia	1(1)
Quality Assurance	2(2)
Occupational Health	3(3)
Research	2(2)
Emergency Room	11(12)
Mental Health	4(4)
Home Health	1(1)
Education	4(4)
Nurse Practitioner	1(1)
Highest Level of Education	
ADN	10(11)
Diploma	7(8)
BSN	55(60)
MSN	17(18)
PhD[b]	1(1)
MPA[b]	1(1)
J.D.[b]	1(1)

[a]n=92

[b]These subjects did not report their nursing degrees.

Sixty percent of the respondents held a Bachelor of Science in Nursing and 21% had higher degrees. Another 16% were pursuing higher education. Attendance at medical readiness and other advanced nursing courses showed that the majority (95%) had participated in unit training exercises, and many less had participated in other types of medical readiness training. Five nurses had been medically involved in an armed conflict situation.

Data Analysis

The knowledge level of USAF flight nurses regarding the injuries of conventional warfare casualties was identified using a 30 question multiple choice test contained in Part II of the survey. The Kuder-Richardson (KR 20) measure of internal consistency was used to estimate the reliability of the test. The KR 20 represents a special use of coefficient alpha and is interpreted the same as alpha. A Kuder-Richardson reliability assumes that test items measure the same factor, and thus is useful in estimating reliability from a single administration of a test (Sax, 1980). The KR 20 for the test used in this study was .60, which is acceptable.

The 92 subjects responding to the survey could have acnieved a maximum score of 30 points and a minimum score of 0. A score of 24 (80% correct) was considered passing, and indicative of adequate knowledge levels. The central tendency and variability information regarding the knowledge scores have been presented in Table 2.

As seen in Table 2, the mean score was 22.13 (73.8%), and the median was 22 (73.3%). An absence of significant skewness indicated that the scores were normally distributed. Based on a passing score of 24 (80%), only 35 (38%) of the respondents passed the test.

Table 2

Central Tendency and Variability in Knowledge Scores of the Sample[a]

Index of Central Tendency	Points
Range	19
Mean	22.13
Median	22
Mode	25
Standard Deviation	3.3

Note. The highest score achieved was 28, the lowest 9.

[a]n=92

Thirteen of these 35 subjects achieved a score of 25 (83.3%) which was the mode.

Mean scores were also compared to demographic variables. The data in Tables 3 and 4 present these results.

The demographic variables shown in Table 3 generally depict only small differences in mean scores. Those aged 40-44 had the highest mean score of 23.0. Males scored one point higher than females with a mean score of 22.8. Nurses with 20-24 years of service also scored higher than those with less service, obtaining a mean score of 23.3.

Based on area of clinical practice, those nurses practicing in orthopedics and quality assurance scored highest with a mean of 23.5. Emergency nurses' scores equalled the overall mean at 22.1. Based on education, Associate Degree nurses scored the highest (23.0), while Master's prepared nurses scored the lowest (21.1). As can be seen in Table 3, no demographic group had a passing mean score of 24.

Table 4, however, presents some interesting results that compare mean scores to another demographic variable which was attendance at seven medical readiness and other advanced nursing trauma courses. Several statistically significant findings were noted.

As can be seen in Table 4, attendance at the Combat Casualty Care Course (C4), Battlefield Nursing Course, Medical Red Flag, and unit training exercises had minimal effect on mean scores. However, attendance at Advanced Trauma Life Support (ATLS), the Trauma Nursing Core Course (TNCC), and Joint Chiefs of Staff (JCS) exercises made a statistically significant difference in mean test scores. In fact, those eight nurses who had attended TNCC were the only group to score

Table 3

Comparison of Demographic Variables and Mean Scores

Demographic Variable	Sample[a] f(%)	Mean Scores
Age		
25-29	10(11)	22.2
30-34	37(40)	22.6
35-39	30(33)	21.4
40-44	11(12)	23.0
45+	4(4)	21.0
Sex		
Male	26(28)	22.8
Female	66(72)	21.8
Length of Service in Years		
1-4	19(21)	22.6
5-9	40(44)	21.8
10-14	17(18)	22.2
15-19	12(13)	21.9
20-24	4(4)	23.3
Area of Clinical Practice		
Orthopedics	2(2)	23.5
Quality Assurance	2(2)	23.5
Critical Care	11(12)	23.2
Nurse Practitioner	1(1)	23.0
Research	2(2)	23.0
Flight Nursing	32(35)	22.8
Occupational Health	3(3)	22.7
Emergency Room	11(12)	22.1
Pediatrics	1(1)	22.0
Mental Health	4(4)	21.3
OR/RR	6(7)	21.0
Medical/Surgical	8(9)	20.9
Education	4(4)	20.5
Oncology	1(1)	20.0
Anesthesia	1(1)	19.0
Management	2(2)	18.5
Home Health	1(1)	18.0

(table continues)

Table 3 (continued)

Demographic Variable	Sample[a] f(%)	Mean Scores
Education		
Diploma	7(8)	21.6
ADN	10(11)	23.0
BSN	55(60)	22.3
MSN	17(18)	21.1
Other	3(3)	23.7

[a] n=92

Table 4

Comparison of Scores[a] Between Those Who Attended Medical Readiness/Other Trauma Nursing Courses and Those Who Did Not

Course	f(%)	Mean Score	t
Combat Casualty Care Course			
Attended	12(13)	23.0	.97
Not Attended	80(87)	22.0	
Battlefield Nursing Course			
Attended	21(23)	22.6	.64
Not Attended	70(77)	22.0	
Advanced Trauma Life Support			
Attended	19(21)	23.9	2.73*
Not Attended	72(79)	21.7	
Trauma Nursing Core Course			
Attended	8(9)	24.6	2.28*
Not Attended	84(91)	21.9	
Medical Red Flag			
Attended	33(36)	21.8	.74
Not Attended	59(64)	22.3	
Joint Chiefs of Staff Exercises			
Attended	36(39)	23.0	2.26*
Not Attended	56(61)	21.5	
Unit Training Exercises			
Attended	87(95)	22.1	.05
Not Attended	5(5)	22.2	

[a] $n=92$

* $p < .05$

a passing grade (24.6). They were followed closely by those who had attended ATLS with a score of 23.9.

In addition to demographic variables and mean scores, data analysis was performed on the 30 question multiple choice test. Table 5 presents those results.

Test items covered a wide variety of injuries and could not be divided into meaningful categories based on body systems or type of injury. Consequently, they were rank ordered based on numbers of correct responses to each item. As seen in Table 5, nine questions were answered correctly by over 90% of the sample, and another nine questions were answered correctly by 70-90% of the subjects. Seven questions had only 50-70% of the subjects answering them correctly. Five questions were answered incorrectly by over 50% of the sample. These last two categories contained many items directly related to military trauma.

Table 5

Frequency Distribution of Correct Responses by the Sample[a] Based on Question Number and Short Description

Question Number	Short Description	f(%)
3.	Sucking Chest Wound	91(98.9)
15.	Level of Consciousness	90(97.8)
10.	Maxillofacial Injuries	88(95.6)
20.	Results of Hemorrhagic Shock	87(95.6)
1.	Penetrating eye injuries	82(90.1)
7.	Gas Gangrene	82(90.1)
14.	Neurovascular Dysfunction	82(90.1)
22.	Hypovolemic Shock Characteristics	82(90.1)
30.	Dysentary	82(90.1)
13.	Debridement	82(89.1)
16.	Increased Intracranial Pressure	81(88.0)
8.	Hip Joint Contracture	81(88.0)
12.	Compartment Syndrome	79(85.8)
23.	Penetrating Abdominal Wound	76(83.5)
25.	Fluid Replacement/Burn	74(81.3)
5.	Tension Pneumothorax	74(80.4)
2.	Description of Pneumothorax	73(79.3)
18.	Spinal Cord Injury	71(78.0)
11.	External Fixation Device	64(69.5)
27.	Blast Injury	62(68.0)
6.	Combat Exhaustion	61(67.0)
29.	Gunshot Wound	59(64.8)
4.	Cardiac Tamponade	58(63.7)
26.	Crush Injury	54(59.3)
9.	Fat Embolism	47(51.6)
21.	Septic Shock	42(46.7)
24.	Burns from Napalm	41(45.0)
28.	High Velocity Gunshot Wounds	38(42.2)
17.	Autonomic Dysreflexia	33(36.7)
19.	First Nursing Action for Shock	20(21.9)

[a] $n=92$

CHAPTER 5

Discussion, Conclusions, and Recommendations

This chapter includes a summary of the findings and conclusions as determined from the study question, which was to describe the knowledge level of Air Force flight nurses regarding the injuries of conventional warfare casualties. Results will also be discussed in relation to the conceptual framework and review of literature.

Findings

As already stated elsewhere in this report, a score of 24 (80%) was required to demonstrate a sufficient knowledge level of the injuries of conventional warfare casualties. The knowledge level of the 92 respondents in this study yielded a mean of 22.1 (73.8%). Only 35 (38%) achieved a score of 24 or higher. These figures indicate the majority of the sample did not have a sufficient knowledge level of conventional warfare casualties; however, a mean of 22.1 also indicates at least some knowledge of these injuries.

None of the demographic variables except attendance at medical readiness and other trauma nursing courses had a significant impact on the scores. Within the latter category, it was shown that subjects who had attended Advanced Trauma Life Support (ATLS), the Trauma Nursing Core Course (TNCC), and Joint Chiefs of Staff (JCS) exercises scored significantly higher than those who had not attended those educational offerings.

Test items covered a wide variety of injuries. Deficits were noted in five areas, such as septic shock, while strengths were noted in nine areas, such as maxillofacial injuries. Deficits and strengths were based on frequencies of correct responses to each item.

Conclusions

Based on the findings of this study, it can be concluded that:

1. The knowledge level of this sample of United States Air Force flight nurses regarding the injuries of conventional warfare casualties was less than the established knowledge level.
2. The variables of age, sex, length of service, length of flight nursing practice, clinical area of practice, education, involvement in an armed conflict, attendance at Medical Red Flag, C4, the Battlefield Nursing Course, and unit training exercises did not seem to increase knowledge levels of the subjects in this study.
3. Subjects who had attended ATLS, TNCC, and JCS exercises scored higher on the test than those who had not attended these offerings.
4. Knowledge of some injuries was found to be especially deficient, such as high velocity gunshot wounds and complications from a spinal cord injury, as evidenced by less than 50% of the subjects answering those questions correctly. Sufficient knowledge was demonstrated by subjects in other types of injuries, such as chest wounds.

Discussion

Relation of Findings to the Theoretical Framework

United States Air Force flight nurses have pledged themselves to the support of the combat forces, and must therefore be ready to care for and transport combat casualties. As nurses, they are

professionally responsible for recognizing their own capabilities and for overcoming any limitations via education. Results of this study indicated that less than 62% of the flight nurses in the sample had an adequate level of knowledge necessary to care for conventional warfare casualties.

Medical readiness courses were created with the knowledge that a significant proportion of medical personnel were neither trained nor inclined toward emergency care (Yarrington, 1985). The results of this study indicated that attending at least two of the medical readiness activities had increased knowledge levels: ATLS and JCS exercises (which consist of simulated conflict situations). A third course, TNCC, while not a military medical readiness course, also had a positive effect on knowledge levels. This three day course is generally available nationwide and was developed by the Emergency Nurses Association. Its primary purpose is to improve the level of nursing care provided in emergency settings by enhancing the cognitive and technical skills used in trauma nursing (Emergency Nurses Association, 1986).

Four other military medical readiness activities, namely Medical Fed Flag, the Battlefield Nursing Course, the Combat Casualty Care Course (C4), and unit training exercises (which may or may not have simulated casualties) were not found to increase knowledge levels. The reasons why are not known and cannot be determined from the study's findings. However, at least part of the study results support the conceptual framework--some medical readiness training can indeed provide nurses with the knowledge they need to care for

conventional warfare casualties and thereby prepare them for their wartime role.

Another part of the theoretical framework involved nursing theory. It was stated that nurses' knowledge of nursing and their capabilities for effective performance were determined by the forms and quality of their education as these related to their individual capabilities. Further, no nurse could be expert in all types of nursing situations and that special situations required special knowledge (Orem, 1985). The results of this study support Orem's statements.

It was interesting to note that there was no relationship between clinical practice areas and scores achieved on the 30 question multiple choice test. Even emergency and critical care nurses did not achieve an 80% knowledge level within their respective groups. Similarly, there was no relationship between level of education and test scores.

From these findings, one may postulate that while nurses must recognize their own capabilities and limitations, they must also identify directions for self-improvement in nursing practice to guide their development as nurses (Orem, 1985). Since the primary mission of flight nursing is the care and transport of combat casualties, flight nurses have the professional responsibility to know about the care and injuries of these casualties. Realistically, it is not possible to learn everything about each type of injury that could be seen during aeromedical evacuation, and a certain amount of on-the-job-training could be expected in the event of casualty movement. However, it is important that flight nurses possess the knowledge

necessary to practice nursing in specific situations with select patient populations. Therefore, at the very least, flight nurses need to have general knowledge of military trauma, which includes multisystem trauma and conventional warfare injuries. The majority of this sample did not have this knowledge.

Because nursing knowledge of conventional warfare casualties is so specialized, it would appear that specialized military courses are the best way to provide this education. In other words, the specialized knowledge that a nurse needs to care for conventional warfare casualties is more a function of specialized education rather than basic or advanced academic nursing education or clinical area of practice.

Relation of Findings to the Review of Literature

Some of the findings of this study also support and relate to the review of literature. Although medical readiness literature focused on physicians and the concept itself, it was evident that it's quality and comprehensiveness were quite important for all health professionals.

In Weiner's (1986) study of the wartime readiness of the Medical Corps, it was noted that C4, Battlefield Medicine, and Medical Red Flag were excellent introductory courses, but that innovative programs were needed to expand this knowledge and maintain readiness. Terry (1981) felt strongly that the Air Force needed a system which improved the corporate memory of wartime medical procedures and training in order to prevent relearning lessons from the past, and that the military must prepare for war in time of peace. The importance of pertinent medical readiness training was the essence of

these two studies; medical readiness training for flight nurses cannot be overemphasized as evidenced by this study. Additionally, the test used to measure knowledge levels exceeded introductory principles of military trauma and its sequela and supports the need for more advanced training, such as that found in ATLS and TNCC.

Information from Vietnam was also reviewed, and included the types of casualties, nursing experiences, and the aeromedical evacuation of the casualties. Casualty information was included mainly to support the questions on the instrument. A hard look at the questions, especially those with a poor correct response percentage revealed several areas of deficient knowledge levels. For example, gunshot wounds, napalm burns, and combat exhaustion were well-reported in the literature (McCaughey, 1987; Cammisa, 1986; McVicker, 1985), but as a group, the subjects did not indicate strong knowledge in these areas. Perhaps the results of this study reflect what Bellamy, Maningas, and Vayer (1986) stated in their study on the epidemiology of military trauma: it does indeed differ from civilian trauma in several aspects, one of which is the type of wound. This position is further strengthened by the Vietnam nursing literature which consistently mentioned the severity of the casualties (McVicker, 1985; Schwartz, 1987; & Paul, 1985).

One other comparison can be drawn from the review of literature and the findings of this study. McVicker (1985), Neel (1973), and Schwartz (1987) all reported in their studies that a stressor for Vietnam nurses was that they felt ill-prepared to care for the casualties. In other words, the nurses apparently did not possess

the knowledge and/or skills that they needed. Based on findings from this study, apparently neither do flight nurses.

Relation of Findings to Assumptions

The findings of this study also supported the initial assumptions. The subjects represented varied nursing backgrounds and all had completed the Flight Nurse Course. The instrument was found to accurately measure knowledge levels (KR 20= .6) of conventional warfare casualties, and the subjects did indeed demonstrate some knowledge of these injuries. While it was also assumed that all flight nurses had received some medical readiness training, it was not assumed that participation in ATLS, TNCC, or JCS exercises would significantly increase knowledge levels.

Implications for Consideration

Although the findings of this study cannot be generalized to the entire flight nurse population, there remain some implications to consider regarding flight nurse practice, and in particular, flight nurse education. Inadequate knowledge levels of conventional warfare injuries could have serious deleterious consequences should a conflict arise and aeromedical evacuation of casualties become a reality. Increased complications and an increased death rate would undoubtedly result, not to mention the fear, frustration, and feelings of inadequacy that would be experienced by the nurses themselves. These feelings have been well-documented in the literature on Vietnam nurses, and are still felt today, years after the fact.

Professional nurses rely on continuing education to alleviate deficiencies in their knowledge and skills, and certainly they have a

responsibility to participate in appropriate educational offerings. The results of this study indicated that schools of nursing (or academic preparation) did not prepare nurses to care for conventional warfare casualties. This is not surprising because military trauma is specialized and beyond the scope of formal nursing education. Consequently, professional flight nurses must seek this education elsewhere, either individually, through formal military medical readiness training, or both.

An ambitious flight nurse could seek out the information on his or her own--it certainly exists in the military medical literature and includes both journals and reference books. It may be that the eight nurses who completed TNCC were motivated and interested in improving their knowledge level of trauma victims, both for their individual clinical and flight nurse practices. Or, flight nurses could make the most of medical readiness activities, especially ATLS and JCS exercises. It was not the intent of this study to evaluate the quality and comprehensiveness of the Air Force's medical readiness programs, yet the results raise questions as to their overall effectiveness in preparing flight nurses for their wartime role.

Unless nurses have studied the injuries of conventional warfare casualties on their own, they become dependent on medical readiness activities and unit inservices to educate them about their primary mission in the Air Force. Perhaps the clinical aspects of medical readiness are a joint responsibility between the Air Force and the professional nurse. If so, a standardized educational program for self-study would be most helpful. Regardless, knowledge of

conventional warfare casualties should become a basic part of each flight nurses's philosophy and orientation towards nursing in general. Afterall, the care and transport of combat casualties is the whole reason for the existence of Air Force flight nursing. It would be advantageous for all concerned to ensure the adequate education of flight nurses to enable them to maximally perform in the transport of United States military casualties.

Recommendations

Based on the results of this study, the following recommendations are made:

1. Development of studies which would evaluate the clinical components and effectiveness of current Air Force medical readiness activities.
2. Replication of this study with expansion of the instrument to include more injuries of conventional warfare casualties.
3. Replication of this study, with instrument revisions, to include random selection of subjects from the entire flight nurse population.
4. Development of standardized educational programs for nurses specifically geared towards the injuries of conventional warfare casualties.
5. Use of the revised instrument as a pre-test and post-test to evaluate the effectiveness of standardized educational programs which teach management of the injuries of conventional warfare casualties.

References

Air Force Manual 1-1. (1984). Basic aerospace doctrine. Washington, DC: Department of the Air Force.

Air Force Pamphlet 164-2. (1983). Aeromedical evacuation nursing. Washington, DC: Department of the Air Force.

Air Force Regulation 50-5. (1987). USAF formal schools. Washington, DC: Department of the Air Force.

Air Force Regulation 164-5. (1975). Worldwide aeromedical evacuation. Washington, DC: Departments of the Air Force, the Army, and the Navy.

Air Force Regulation 160-25. (1986). Medical readiness, planning, and training. Washington, DC: Department of the Air Force.

Air Force Regulation 168-4. (1987). Administration of medical activities. In Chapter 5, Medical wartime planning. Washington, DC: Department of the Air Force.

Battlefield Nursing Course Lesson Plans. (1987). Brooks Air Force Base, TX: USAF School of Aerospace Medicine.

Beary, J. F. (1984). Strategic planning: Military medicine in the eighties. Military Medicine, 149, 181-183.

Bellamy, R. F., Maningas, P. A., & Vayer, J. S. (1986). Epidemiology of trauma: Military experience. Annals of Emergency Medicine, 15, 1384-1388.

Brunner, L. S., & Suddarth, D. S. (1986). The Lippincott manual of nursing practice (4th ed.). Philadelphia, PA: J. B. Lippincott Co.

Cammisa, M. (1986). Modern combat medicine. International Combat Arms, 4, 84-87.

Combat Casualty Care Course Lesson Plans. (1987). Fort Sam Houston, TX: Department of the Army.

Dewane, C. J. (1984). Posttraumatic stress disorder in medical personnel in Vietnam. Hospital and Community Psychiatry, 35, 1232-1234.

Emergency Nurses Association. (1986). Trauma nursing core course (provider) manual (2nd ed.). Chicago, IL: Award Printing Corporation.

Forrister, T. C. (1982). Readiness: Training for the future. Medical Service Digest, 33(3), 4.

Foster, P. C., & Janssens, N. P. (1985). Dorothea E. Orem. In J. B. George (Ed.), Nursing theories (pp. 124-139). Englewood Cliffs, NJ: Prentice-Hall.

Gronlund, N. E. (1973). Preparing criterion-referenced tests for classroom instruction. New York: McMillan Co.

Hansell, C. L., & Martin, D. (1987). Aeromedical evacuation command and control functional elements (Contract NO. F19628-84-D-0009). Burlington, MA: Analytical Systems Engineering Corp.

Hepps, S. A., Marcantonio, A., Hohman, W. R., Bradley, D. D., Gazzaniga, A., & Simmons, J. Q. (1985). A combat casualty course for increasing the operational readiness of reserve component health care professionals. Military Medicine, 150, 97-100.

Laurent, C. L. (1988). Knowledge level of Navy nurse corps officers in the triage of thermonuclear casualties. Unpublished master's thesis, University of Alabama at Birmingham, Birmingham, AL.

Marshall, K. (1987). In the combat zone--an oral history of American women in Vietnam. Boston, MA: Little, Brown and Co.

McCaughey, B. G. (1987). Naval support activity hospital DaNang combat casualty deaths January to June 1968. Military Medicine, 152, 284-289.

McHail, W. A. (1987). Deployable medical systems (DEPMEDS) concepts and training (Research Report). Washington, DC: National Defense University.

McVicker, A. (1985). Invisible veterans, the women who served in Vietnam. Journal of Psychosocial Nursing, 23(10), 13-19.

Military Airlift Command Regulation 51-164. (1986). Aeromedical evacuation crew member (AECM) training. Scott Air Force Base, IL: HQ Military Airlift Command.

Military Airlift Command Regulation 164-1. (1982). MAC worldwide aeromedical evacuation. Scott Air Force Base, IL: HQ Military Airlift Command.

Naval Health Education and Training Command. (1982). Combat casualty care. Washington, DC: Naval Education and Training Program Center.

Neel, S. (1973). Medical support of the U.S. Army in Vietnam. Washington, DC: Department of the Army.

Newell, C. L., & Anderson, G. K. (1986). Medical readiness beyond cost-benefit ratios. Medical Service Digest, 38(2), 15- 17.

Odom, J. D. (1986). The Vietnam nurses can't forget. American Journal of Nursing, 9, 1035-1037.

Orem, D. E. (1985). Nursing concepts of practice. New York: McGraw-Hill.

Paul, E. A. (1985). Wounded healers: A summary of the Vietnam nurse veteran project. Military Medicine, 150, 571-576.

Pohlman, G. P., Reynolds, N. C., & Zimmerman, R. C. (1986). Training military reserve medics in combat casualty care: An example of military-civilian collaboration. Military Medicine, 151, 97-100.

Project Corona Harvest. (1968). A study of the early aeromedical evacuation of Vietnam casualties (No. 0009580). Publishing data not available.

Rogers, B., & Nickolaus, J. (1987). Vietnam nurses. Journal of Psychosocial Nursing, 25(4), 11-15.

Sax, G. (1980). Principles of educational and psychological measurement and evaluation (2nd ed.). Belmont, CA: Wadsworth Publishing Co.

Schwartz, L. S. (1987). Women and the Vietnam experience. Image, 19, 168-173.

Shy, G. E. (1984). Reserves perform vital role in operation urgent fury. Medical Service Digest, 35(1), 5-7.

Strange, J. M. (Ed.). (1987). Shock trauma care plans. Springhouse, PA: Springhouse Corporation.

Terry, C. R. (1981). Medical wartime training for physicians of the armed forces: 1979-1981 (Report No. MS 119-81). Maxwell Air Force Base, AL: Air University.

Title 5, United States Code 3331. (1983). Oath of office.

United States Air Force School of Aerospace Medicine. (1975). Southeast Asia operational aeromedical support: Lessons learned (Review 8-75). Brooks Air Force Base, TX: Aerospace Medical Division.

United States Department of Defense. (1975). Emergency war surgery: First United States revision emergency war surgery NATO handbook. Washington, DC: Author.

United States Department of Defense. (1987). DEPMEDS policies/guidelines treatment briefs. Fort Sam Houston, TX: Academy of Health Sciences.

Weiner, S. L. (1986). Medical corps readiness for major conflict. Military Medicine, 151, 321-326.

Weiner, S. L., & Barrett, J. (1986). Trauma management for civilian and military physicians. Philadelphia, PA: W. B. Saunders Co.

Winkler, W. (1986). Medicine and the modern battlefield. NATO's Sixteen Nations, 31, 50-53.

Yarrington, C. T. (1985). Medical readiness. Military Medicine, 150, 119-122.

Appendix A

908 Inverness Cliffs
Birmingham, AL 35242

USAF SCN 88-88
(Expires 31 Dec 88)

Dear Colleague,

I am an Air Force Institute of Technology (AFIT) student in the Graduate Nursing Program, Trauma option, at the University of Alabama at Birmingham, AL. As part of the program requirements, I am conducting a study to assess the knowledge level of Air Force flight nurses regarding the injuries of conventional warfare casualties. While the potential types of injuries that could occur during a conventional war are many, I have developed multiple choice questions about some of the more frequently predicted injuries. Knowledge levels will be obtained through the correct/incorrect answers to the questions.

Participation in this study is entirely voluntary. Your responses will be anonymous and no individual, other than myself, will see the survey results. Results will be presented as grouped data. The purpose of this survey is to determine knowledge levels only. Please do not write your name on the survey form to ensure your anonymity. All surveys will be destroyed upon completion of the study.

You are one of 150 flight nurses in the Air Force Reserve, Air National Guard, and on active duty selected to participate in this study. All respondents must have been on flying status for at least one year. If you decide to participate, please complete both parts of the enclosed survey. It will take approximately 20-30 minutes to complete. Return to me in the stamped, self-addressed envelope by 1 December 88. If you would like to receive a copy of the findings of this study, please enclose a request with your name and address. I would be happy to forward a copy to you when the project is completed.

Thank you for your time and effort!

CHERYL A. ALLEN, Maj, USAF, NC
AFIT Student

SURVEY BEGINS ON BACK OF THIS PAGE

KNOWLEDGE LEVEL OF USAF FLIGHT NURSES
REGARDING THE INJURIES OF CONVENTIONAL WARFARE CASUALTIES

A SURVEY

PART I. DEMOGRAPHIC DATA

The following information is needed to help in the analysis of data. It will allow comparisons to be made among different groups of respondents. Fill in the blanks and/or circle the appropriate response.

1. Age: _____
2. Sex: 1. Female 2. Male
3. Length of Service: Years _____
4. Length of Nursing Practice: Years _____
5. Length of Flight Nursing Practice: Years _____
6. Year of graduation from the Flight Nurse Course: _____
7. What is your present area of clinical practice:

1.	Medical/Surgical	9.	OR-RR	16.	OB-GYN
2.	Nursery/Neonatal	10.	Pediatrics	17.	Emergency Dept
3.	Critical Care	11.	Orthopedics	18.	Mental Health
4.	Oncology	12.	Anesthesia	19.	Home Health
5.	Infection Control	13.	Quality Assurance	20.	School Health
6.	Community Health	14.	Occupational Health		
7.	Management	15.	Research	21.	Education
8.	Flight Nursing (Full-time)			22.	Unemployed

Other (Specify) _____

8. Highest level of education obtained: _____
9. Have you ever been involved in an armed conflict in a medical capacity?
   1. Yes 2. No
10. Have you ever attended:

A.	Combat Casualty Care Course.....	1. Yes	2.	No
B.	Battlefield Nursing Course.....	1. Yes	2.	No
C.	Advanced Trauma Life Support.....	1. Yes	2.	No
D.	Trauma Nursing Core Course.....	1. Yes	2.	No
E.	Medical Red Flag.....	1. Yes	2.	No
F.	Major JCS Exercises, such as TEAM SPIRIT or REFORGER.....	1. Yes	2.	No
G.	Unit Training Exercises.....	1. Yes	2.	No

PART II.

Please answer the following questions by circling the letter for the best response. Remember, this is only a method for determining knowledge levels. If you do not know the answer, circle the "Don't know" response. "Don't know" responses are perfectly acceptable and expected. Please do not use external sources to answer the questions.

1. A penetrating injury to one eye would necessitate which of the following nursing actions?

   a. Patch both eyes
   b. Patch the injured eye
   c. Do not patch eyes
   d. Don't know

2. A pneumohemothorax is best described by which of the following?

   a. Blood only in the pleural cavity
   b. Air only in the pleural cavity
   c. Blood and air in the pleural cavity
   d. Don't know

3. A sucking chest wound is best described by which of the following?

   a. Multiple fractured ribs which disrupt chest wall continuity and cause paradoxical chest movement
   b. Air passing through a chest wound on inspiration, causing collapse of the lung on the injured side
   c. Hemorrhage into the chest cavity causing vena cava compression and right sided heart failure
   d. Don't know

4. Distended neck veins, hypotension, tachycardia, and air hunger in a chest trauma victim whose trachea is in midline position would require which of the following nursing actions?

   a. Suspect a cardiac tamponade and prepare for pericardiocentesis
   b. Suspect a tension pneumothorax and prepare for chest tube insertion
   c. Suspect right sided heart failure and prepare for ventilatory assistance
   d. Don't know

5. A patient has a clogged chest tube. You would suspect a tension pneumothorax if you detected which of the following?

   a. Splinting of the chest wall and hypoventilation
   b. Tracheal deviation away from the affected side
   c. Area around the chest tube site becoming edematous
   d. Don't know

6. Combat exhaustion is characterized by which of the following?

   a. Euphoria, sharpened skills and senses
   b. Insomnia, anorexia, and malaise
   c. Unrelenting fatigue, anxiety, somatic symptoms
   d. Don't know

7. Local responses to gas gangrene can cause which of the following?

   a. Pain disproportionate to wound severity, discoloration of tissue, putrid odor
   b. Severe pain, copious amounts of purulent greenish drainage, no odor
   c. Frank bleeding, decreased neurovascular sensation, profound hypotension
   d. Don't know

8. Hip joint contractures on the affected leg after an above-the-knee amputation can be prevented by which of the following nursing actions?

   a. Immobilize the joint
   b. Encourage joint movement
   c. Pad around the stump
   d. Don't know

9. Fat embolism is characterized by which of the following?

   a. Tachypnea, hyperthermia, disorientation
   b. Bradycardia, areflexia, hypothermia
   c. Pettechie, areflexia, hypertension
   d. Don't know

10. A maxillofacial injured patient's immediate post-operative problems include which of the following?

    a. Potential for airway occlusion, hemorrhage, and infection
    b. Potential for scarring, infection, and deformities
    c. Potential for vomiting, poor appetite, and malnutrition
    d. Don't know

11. An external fixation device to immobilize a fractured extremity is best described by which of the following?

    a. A special cast with handles to facilitate elevation that can be removed to view external injuries
    b. No cast--pins inserted through the bones and attached to a rigid external frame
    c. No cast--limb will be immobilized with soft splints and attached to external traction
    d. Don't know

12. A patient with multiple fragment wounds to his leg and vascular and nerve damage complains of severe pain, paresthesia in his leg, and muscle weakness. His thigh is firm and edematous. You suspect which of the following?

    a. Compartment syndrome
    b. Nothing--this is a normal response
    c. A wound infection
    d. Don't know

13. Debridement of an open wound is justified based on which of the following rationales?

    a. To reduce ultimate scar formation
    b. To leave only viable tissue
    c. To diminish soft tissue inflammation
    d. Don't know

14. Neurovascular dysfunction in an extremity immobilized by a rigid cast is characterized by which of the following?

    a. Pruritis, paresthesia, papilledema
    b. Painfullness, pallor, paresthesia
    c. Pulselessness, pink color, pain
    d. Don't know

15. Appropriate assessment for level of consciousness in a head injured patient includes which of the following?

    a. Verbal response, motor response, eye opening response, pupil reaction to light
    b. Spinal motor reflexes, breathing pattern, temperature, sensation of touch
    c. Complaints of pain, vital signs, intake and output, pupil reaction to light
    d. Don't know

16. Increased intracranial pressure in a head injured patient is indicated by which of the following manifestations?

    a. Fever, change in the level of consciousness, increased diastolic blood pressure
    b. Headache, change in the level of consciousness, widened pulse pressure
    c. Hyperventilation, distended neck veins, decreased systolic blood pressure
    d. Don't know

17. Autonomic dysreflexia in a spinal cord injured patient requires which of the following nursing actions?

    a. Assessment of all reflexes regularly to detect any abnormalities
    b. No action required--this is normal for a cord injured patient
    c. Removing the stimulus that is triggering the episode
    d. Don't know

18. A completely severed spinal cord at T-9 would result in which of the following manisfestations?

    a. Paralysis of lower extremities
    b. Paralysis of upper extremities
    c. Paralysis of respiratory muscles
    d. Don't know

19. Suspected hypovolemic shock requires which of the following <u>immediate</u> nursing actions?

    a. Providing a patent airway
    b. Starting an intravenous line
    c. Taking a blood pressure
    d. Don't know

20. Hemorrhagic shock results in which of the following?

    a. Decreased tissue perfusion related to fluid volume deficit
    b. Systemic infection related to bacterial invasion
    c. Impaired gas exchange related to fluid in the alveoli
    d. Don't know

21. Septic shock may result in which of the following?

    a. Histamine release causing vasodilation and third spacing
    b. Infection of injured tissues which release neurotoxins into circulation
    c. Stimulation of the autonomic nervous system causing vasodilation
    d. Don't know

22. Late hypovolemic shock is characterized by which of the following?

    a. Respiratory failure, generalized urticaria, nausea and vomiting, decreased diastolic blood pressure
    b. Normal to decreased blood pressure, pulse around 100, normal to delayed capillary refill, mild anxiety
    c. Decreased blood pressure, pulse rate over 140, delayed capillary refill, confusion and lethargy
    d. Don't know

23. Penetrating trauma to the abdomen most frequently results in which of the following serious complications?

    a. Persistent paralytic ileus
    b. Severe watery diarrhea
    c. Stress ulcer syndrome
    d. Don't know

24. Skin contact with hot metal or napalm most often results in which of the following?

    a. Severe first degree burns
    b. Severe second degree burns
    c. Severe third degree burns
    d. Don't know

25. Adequate fluid replacement for a severely burned patient is best indicated by which of the following?

    a. Amount of 24 hour urinary output
    b. Hematocrit and hemoglobin levels
    c. Special serum chemistry panel
    d. Don't know

26. Traumatic crush injury is frequently associated with which of the following complications?

    a. Shock and renal failure
    b. Hypervolemia and infection
    c. Skin avulsions and shock
    d. Don't know

27. A blast injury results from which of the following mechanisms of injuries?

    a. Pressure waves generated by an explosion as they strike body surfaces
    b. Kinetic energy being dissapated within the tissues by a missile
    c. Low velocity gunshot wounds which have increased yaw and tumbling
    d. Don't know

28. Massive soft tissue damage caused by high velocity bullets is primarily a result of which of the following?

    a. Non-fragmentation of the bullet and yaw
    b. Bullet tumbling and tissue contamination
    c. Bullet fragmentation and increased yaw
    d. Don't know

29. Gunshot wounds may result in all of the following <u>except</u>:

    a. A temporary cavity in the tissues that is ten times the diameter of the bullet
    b. Tissue stretch from cavitation which can pulverize organs such as the liver and spleen
    c. Exit wounds from high velocity bullets that are generally round or slit-like in shape
    d. Don't know

30. Nursing care for a patient with dysentary includes which of the following?

    a. Administration of steroids as ordered and close observation for urine and retention in toxic patients
    b. Administration of Chloroquine as ordered and institution of supportive nursing measures
    c. IV infusions as ordered to correct fluid and electrolyte imbalance from severe diarrhea
    d. Don't know

THANK YOU FOR YOUR PARTICIPATION!

Appendix B

908 Inverness Cliffs
Birmingham, AL 35242

22 Sept 88

Dear (Name of Chief Nurse),

In the event of conventional warfare, Air Force nurses will be expected to care for multiply injured casualties. As a requirement for graduate study at the University of Alabama at Birmingham, I am conducting a study to assess the knowledge level of Air Force flight nurses regarding the injuries of conventional warfare casualties. Knowledge levels will be reflected by responses to an investigator-developed questionnaire. This study has been approved by the Air Force Institute of Technology.

Your unit is one of fifteen arbitrarily selected from among the 35 aeromedical evacuation units. Because it is difficult to obtain the names and addresses for all assigned flight nurses, I am respectfully requesting your assistance in the distribution of these surveys. Please distribute the questionnaires to nurses who have been on flying status for at least one year. If possible, a broad range of rank and clinical experiences is preferred. Instructions for actual survey completion and disposition are included in the cover letter *to each* nurse. Participation in this study is voluntary. Returned surveys will be anonymous, and only grouped data will be reported.

I am most grateful for your help in this project and sincerely appreciate your efforts towards distribution of the questionnaires. If you would like to receive a copy of the findings of this study, please complete the request for an abstract and return it to me. I will be happy to send it to you upon completion of the project. If you have any further questions, please write or call me collect at 205-995-0646.

Sincerely,

CHERYL A. ALLEN, Maj, USAF, NC
Air Force Institute of Technology Student

Please send a copy of the study findings to:

_____

_____

_____

Appendix C

17 AUG 1988

FROM: AFIT/XPX

SUBJECT: Survey Approval

TO: CIMI (Capt Goetz) (Major Allen)

1. Review of Major Allen's proposed survey, assessing the knowledge level of USAF flight nurses has been completed by this office and by Mr. Charles H. Hamilton, AFMPC/DPMYOS. The survey is approved provided minor changes are made before distributing surveys.

2. The assigned USAF SCN of 88-88 and expiration date of 31 Dec 88 should be displayed on the cover letter or the top right corner of each survey booklet. If you have any questions, please contact me at ext 55760.

KIMBERLY D. ERISCO, 2d Lt, USAF
Asst Chief, Evaluation and Technology

1 Atch
Necessary Changes